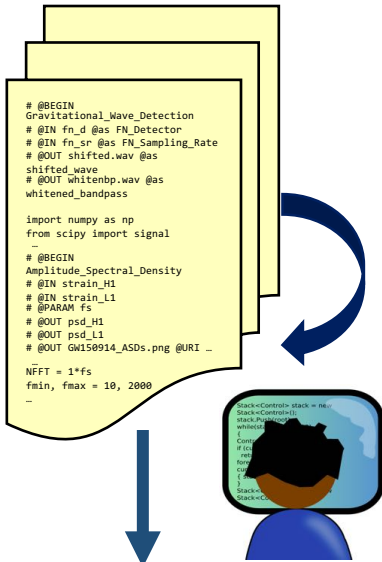


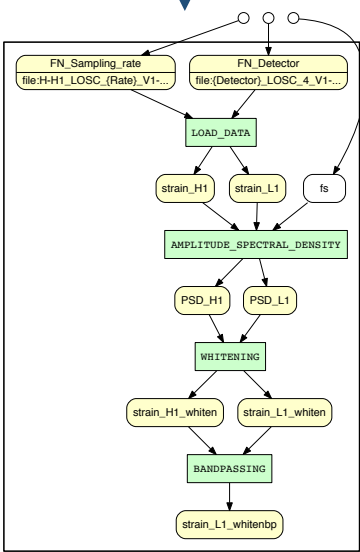
YesWorkflow-annotated scripts



YesWorkflow toolkit
Extract annotations and model script as a workflow

Workflow model (graph)
Facts (Prolog)

YesWorkflow toolkit
Render workflow model graphically



Prospective Provenance
user-defined workflow models

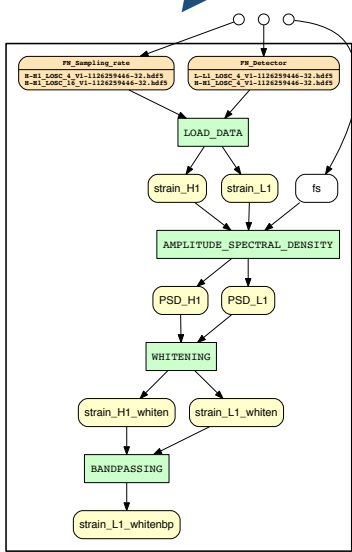
General purpose provenance bridges

Logic rules for reconstructing, querying, and visualizing prospective and retrospective provenance together

YesWorkflow toolkit
Reconstruct script run and retrospective provenance

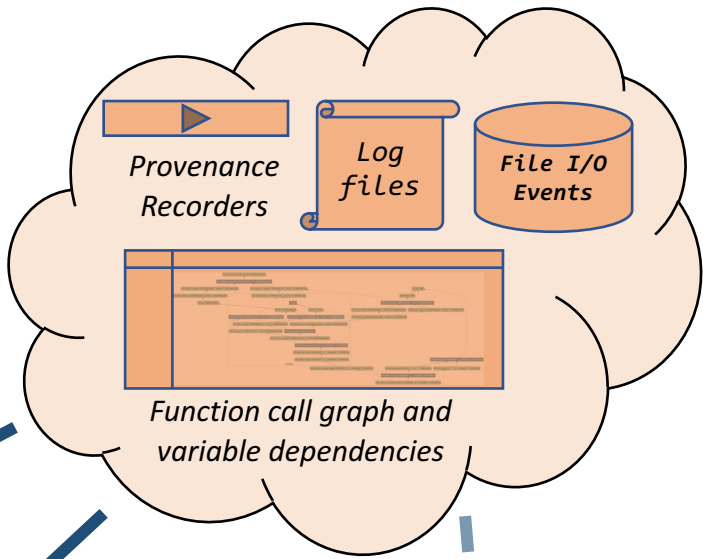
Reconstructed provenance
Facts (Prolog)

Provenance queries
Query provenance (esp. graphs) and visualize results



Hybrid Provenance
prospective + file-level runtime observables
prospective + code-level runtime observables

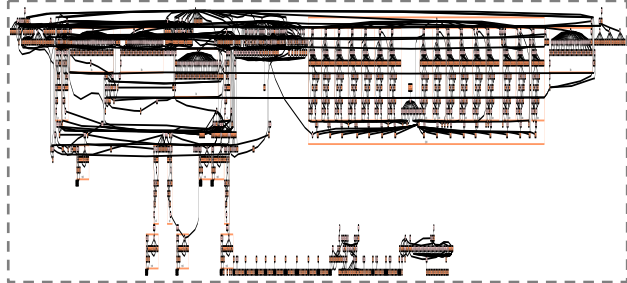
Raw runtime observations



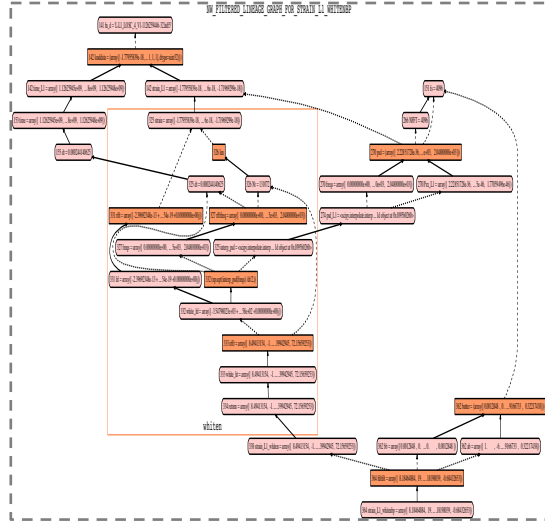
Provenance Exporters
Query and visualize provenance

Run observations
Facts (Prolog)

noWorkflow toolkit
Query and visualize provenance



subgraph



Retrospective Provenance
Python runtime observables